REMARKS

Status of the Claims

Claims 1, 2, 5-22, and 25-33 are pending, with claims 1, 25, and 32 being independent. Claim 32 has been amended to even more particularly recite and distinctly claim the present invention. Support for the amendment to claim 32 can be found throughout the specification, including, for example, at page 20, line 27 – page 21, line 3. Therefore, no new matter has been entered.

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding rejections in view of the following remarks and the previously submitted Declaration pursuant to 35 U.S.C. § 1.132 by Richard O. Moore, Jr (hereinafter "the Declaration").

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 2, 5-18, 21, 25-27, 30, and 31 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over U.S. Patent No. 2,877,257 ("Cain") in view of U.S. Publication No. 2002/0173556 ("Moore"). Applicants respectfully disagree with the rejection; therefore, Applicants maintain their traversal of this rejection.

Cain relates to a process for the purification of hydrocarbon solutions of oxygenated organic compounds comprising acids and which also may contain dissolved or occluded metal contaminants such as ***iron or iron compounds***. (Column 1, Lines 15-19, emphasis added). Cain discloses that the contaminated hydrocarbon products can be produced by synthesis when carbon monoxide and hydrogen are reacted with a promoted iron catalyst. (Col. 1, Lines 26-36). Cain discloses that the product produced from such a process contains dissolved or occluded metal contaminants such as iron or iron compounds. (Col. 1, lines 51-54). Accordingly, as concluded in the Declaration, ***Cain is attempting to address the problem of removal of dissolved or occluded iron contaminants from hydrocarbon products.***

With regard to the purification process, Cain discloses that a crude hydrocarbon synthesis oil is washed with an aqueous acid solution and this washing step is repeated until no brown precipitate is produced on the addition of a suitable base to the acid extract. (Figure 2 and Column 2, Lines 19-25). Cain further discloses that the oil treated in this manner is then neutralized in a neutralization vessel with an aqueous caustic solution to produce an

upper neutral oil layer containing dissolved chemicals. (Figure 2 and Column 2, Lines 36-38). Cain discloses that from the bottom of the neutralization vessel, a rich aqueous soap solution, free of iron and basic nitrogen compounds, is withdrawn. (Column 7, Lines 40-60 and Figure 2). As provided in the Declaration, the iron contamination is particularly troublesome and needs to be removed because of the detrimental effect it has on the extraction process disclosed in Cain. Accordingly, Applicants maintain that the process for purification in Cain is particular to the synthesis process disclosed therein, the resulting contamination, and the extraction process utilized.

Cain does not mention or make any suggestion of aluminum and/or any aluminum contamination. As provided in the Declaration, Applicants maintain that it is well known to those of skill in the art that iron Fischer Tropsch catalysts are generally bulk iron materials, without a metal oxide support. Accordingly, Applicants maintain that ***one of skill in the art experiencing an aluminum contamination problem, as in the present invention, would not turn to Cain for a possible solution.***

Moore is directed to a method for preparing liquid fuel in a hydrocarbon synthesis process, and more specifically for preparing a stabilized mixed fuel from a carbon source at a remote site, and tailoring one or more finished fuel products from the mixed fuel in order to meet local fuel requirements at a market site. (Page 1, Paragraph [0001]). Moore discloses mildly hydrotreating a stabilized product mixture at a market site to remove contaminants accumulated in the product during transportation. (Page 3, Paragraphs [0037] and [0054]). Moore is cited as disclosing that Fischer Tropsch streams are produced in processes that utilize iron or cobalt catalysts.

Applicants respectfully submit that the invention as set forth in claims 1, 2, 5-18, 21, 25-27, 30, and 31 evidences non-obviousness in view of Cain and Moore. As concluded in the Declaration, Applicants maintain that one of skill in the art would not merely combine process features of Moore with Cain.

As described above, Cain is attempting to address removal of iron contaminants from hydrocarbon products, and as disclosed by Cain, the iron contamination is particularly troublesome and needs to be removed because of the detrimental effect it has on the extraction process used in Cain. Cain does not disclose or suggest the presence of aluminum and/or any aluminum contamination. It is well known to those of skill in the art that iron Fischer Tropsch catalysts, as used in Cain, are generally bulk iron materials, without a metal

oxide support (such as aluminum). Accordingly, one of skill in the art experiencing an aluminum contamination problem, as in the present invention, would not turn to the process as disclosed in Cain for a possible solution.

As provided in the Declaration, there is no disclosure or suggestion in Cain or Moore, that a cobalt catalyst would cause any contamination, much less contamination as experienced in Cain. Furthermore, as set forth in the Declaration, there is no disclosure or suggestion in Cain or Moore that any such contamination would have the same detrimental effect on the extraction process as disclosed in Cain. Accordingly, as concluded in the Declaration, there is no disclosure or suggestion in Cain or Moore that a metal removal process would be required if a cobalt catalyst, as disclosed in Moore, were used rather than the iron catalyst of Cain.

Furthermore, the present invention relates to removal of soluble and very finely divided particulate aluminum contaminants. As provided in the Declaration, one of skill in the art would readily recognize that a chemical reaction would be required to produce aluminum contaminants with these physical properties. In the presently claimed process, the aluminum contaminants are produced using a cobalt catalyst. As provided in the Declaration, one of skill in the art readily understands that a cobalt catalyst, when used in a Fischer Tropsch process, produces a different distribution of products and contaminants than using an iron catalyst. Therefore, as concluded in the Declaration, one of skill in the art when using a Fischer Tropsch process including a cobalt catalyst as disclosed in Moore, would not look to Cain for a purification process to solve a contamination problem specific to use of the cobalt catalyst.

Moreover, Applicants maintain that even if there were some suggestion or motivation to combine Cain and Moore and a reasonable expectation of success, Cain and Moore, even when combined, do not disclose or suggest all the claim limitations of independent claim 1 or claims dependent thereon. As described above, Cain discloses that a crude hydrocarbon synthesis oil is washed with an aqueous acid solution and this washing step is repeated until no brown precipitate is produced on the addition of a suitable base to the acid extract. Cain discloses that the oil treated in this manner is then *neutralized* in a neutralization vessel with an aqueous caustic solution.

Accordingly, even if combined, Cain and Moore do not disclose or suggest a method of removing contamination from a Fischer-Tropsch derived hydrocarbon stream comprising:

conducting a Fischer-Tropsch process using a catalyst comprising cobalt to produce a Fischer-Tropsch derived hydrocarbon stream; passing the Fischer-Tropsch derived hydrocarbon stream to a treatment zone; passing an aqueous acidic stream to the treatment zone; contacting the Fischer-Tropsch derived hydrocarbon stream with the aqueous acidic stream in the treatment zone to form a mixed stream; separating the mixed stream into at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream, and at least one modified aqueous acidic stream; passing the at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream to a hydroprocessing reactor containing catalyst beds; and hydroprocessing the acidic extracted Fischer-Tropsch derived hydrocarbon stream to provide a hydroprocessed product stream, wherein the contacting step removes Al contamination from the Fischer-Tropsch derived hydrocarbon stream and substantially reduces plugging of catalyst beds in the hydroprocessing reactor.

Therefore, for at least the above-noted reasons, Applicants respectfully request that the obviousness rejection of claims 1, 2, 5-18, and 21 over Cain in view of Moore be withdrawn.

With regard to independent claim 25, this claim recites a method of removing contamination from a Fischer-Tropsch derived hydrocarbon stream. The method comprises conducting a Fischer-Tropsch process using a catalyst comprising cobalt to produce a Fischer-Tropsch derived hydrocarbon stream; passing the Fischer-Tropsch derived hydrocarbon stream to a treatment zone; passing an aqueous acidic stream to the treatment zone; extracting Al contamination from the Fischer-Tropsch derived hydrocarbon stream by contacting the Fischer-Tropsch derived hydrocarbon stream with the aqueous acidic stream in the treatment zone at extraction conditions to form a mixed stream comprising at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream, a modified aqueous acidic stream, and a third phase; and separating the at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream from the modified aqueous acidic stream and the third phase, wherein after the extraction step the contamination contained in the modified aqueous acidic stream and the third phase is greater than the contamination contained in the extracted Fischer-Tropsch derived hydrocarbon stream.

As disclosed in the present application, a third phase may form during extraction of the Fischer-Tropsch derived hydrocarbon stream with an aqueous acidic stream. The third

phase is substantially distinct from the extracted Fischer-Tropsch derived hydrocarbon stream and the modified aqueous acidic stream. Contamination from the Fischer-Tropsch derived hydrocarbon stream may be concentrated into this third phase. (Page 9, Lines 17-27).

Applicants respectfully submit that in the process of claim 25, the Fischer-Tropsch derived hydrocarbon stream is contacted with an aqueous acidic stream to form a mixed stream of ***three phases***: an acidic extracted Fischer-Tropsch derived hydrocarbon stream, a modified aqueous acidic stream, and a third phase. Applicants respectfully submit that performing an extraction and obtaining three distinct phases, which are then separated, is substantially different than performing two separations as disclosed in Cain.

Applicants respectfully maintain that in no way does Cain or Moore disclose or suggest separating at least one acidic extracted Fischer-Tropsch derived hydrocarbon stream from a modified aqueous acidic stream and a third phase, wherein after the extraction step the contamination contained in the modified aqueous acidic stream and the third phase is greater than the contamination contained in the extracted Fischer-Tropsch derived hydrocarbon stream.

Applicants note that the Examiner points to stream (28) and stream (22) in Cain, as providing the acidic stream and the third phase. Applicants note, however, as illustrated in Figure 2 of Cain, the acid extraction is performed in the Extractor (2). A primary oil (4) and a water solution of acetic acid (6) are introduced into the Extractor. From the base of the Extractor there is withdrawn an aqueous extract of water-soluble chemicals, iron salts, and salts of basic nitrogen compounds (8). The washed primary oil (10) emerges from the top of the extractor. Accordingly, in Cain this portion of the process disclosed therein is the acid extraction to remove dissolved or occluded metal contaminants such as iron or iron compounds and there are only two phases and two streams withdrawn.

With regard to stream 22 and stream 28, these streams are withdrawn from a stripping column. As such, it is respectfully submitted that Cain does not disclose or suggest that the combination of primary oil and water solution of acetic acid forms three phases in the Extractor, as presently claimed. Applicants respectfully submit that performing an extraction and obtaining three distinct phases to be separated (as presently claimed) is ***substantially different*** than performing two sequential separations as disclosed in Cain. Applicants assert that it is not merely a variation in the sequence of performing steps to perform an extraction and obtain three distinct phases. In Cain, the primary oil (4) and water solution of acetic acid

(6) separate into two phases. Applicants respectfully submit that further separating the water solution of acetic acid in a stripping column is substantially different than obtaining three distinct phases in the initial extraction step. Applicants respectfully submit that one of skill in the art would not see this distinction as merely a variation in the sequence of performing steps. Applicants respectfully assert that one of skill in the art understands that based upon the extraction conditions, when the extraction is performed, it separates into either two or three phases.

Moreover, as described above and as concluded in the Declaration, there is no suggestion or motivation to combine Cain and Moore and no reasonable expectation of success in doing so.

Therefore, Applicants respectfully submit that the presently claimed process is significantly different than the process of Cain. Applicants respectfully submit that even if there were some suggestion or motivation to combine Cain and Moore and a reasonable expectation of success, Cain and Moore, even when combined, do not disclose or suggest all the present claim limitations of claim 25 or claims dependent thereon.

Accordingly, for at least the above described reasons, Applicants respectfully request that the obviousness rejection of claims 25-27, 30, and 31 over Cain in view of Moore be withdrawn.

Claims 19, 20, 22, 28, and 29 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Cain in view of Moore and further in view of U.S. Patent No. 6,476,086 ("Zhou"). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

As described above, Cain relates to a process for the purification of hydrocarbon solutions of oxygenated organic compounds comprising acids and which also may contain dissolved or occluded metal contaminants such as iron or iron compounds. (Column 1, Lines 15-19, emphasis added). Cain discloses that the contaminated hydrocarbon organic chemical mixture can be the product produced by synthesis when carbon monoxide and hydrogen are reacted with a promoted iron catalyst. (Col. 1, Lines 26-36). Cain discloses that the product produced from such a process contains dissolved or occluded metal contaminants such as iron or iron compounds. (Col. 1, lines 51-54). Accordingly, as concluded in the attached Declaration, Cain is attempting to address the problem of removal of dissolved or occluded

iron contaminants from hydrocarbon products. As provided in the Declaration, the iron contamination is particularly troublesome and needs to be removed because of the detrimental effect it has on the extraction process disclosed therein. Accordingly, the process for purification in Cain is particular to the synthesis process disclosed therein, the resulting contamination, and the extraction process utilized.

Cain does not mention or make any suggestion of aluminum and/or any aluminum contamination. As provided in the Declaration, it is well known to those of skill in the art that iron Fischer Tropsch catalysts are generally bulk iron materials, without a metal oxide support. Accordingly, as concluded in the Declaration, one of skill in the art experiencing an aluminum contamination problem, as in the present invention, would not turn to Cain for a possible solution.

Also as described above, Moore is directed to a method for preparing a stabilized mixed fuel from a carbon source at a remote site, and tailoring one or more finished fuel products from the mixed fuel in order to meet local fuel requirements at a market site. Moore is cited as disclosing that Fischer Tropsch streams are produced in processes that utilize iron or cobalt catalysts. Moore is also cited as disclosing "that F-T derived streams may be fractionated (i.e., distilled) and hydrotreated."

Zhou relates to a method for separating iron-based catalyst fines from hydrocarbon liquid/wax/catalyst slurry for Fischer-Tropsch synthesis processes by contacting and/or mixing the slurry with a coalescence enhancing treating solution to facilitate gravity separation and settling of such catalyst, and thereby yield a substantially clean hydrocarbon liquid/wax product. (Abstract). Zhou discloses that the treating solution includes a surface tension reducing agent, an agglutinating agent, and a coalescing agent, each in selected proportions in aqueous solution. (Abstract). Zhou is cited as disclosing filtration techniques used to separate solid contaminants from Fischer Tropsch derived streams.

As described above and as set forth in the Declaration, Applicants maintain that the presently claimed process is significantly different than the process of Cain and one of skill in the art would not merely combine process features of Moore with Cain.

Zhou is cited merely as disclosing filtration techniques used to separate solid contaminants from Fischer Tropsch derived streams. Accordingly, as cited, Zhou fails to cure the many above-described deficiencies with respect to Cain and Moore.

Accordingly, for at least the above described reasons, Applicants respectfully request that the obviousness rejection of claims 19, 20, 22, 28, and 29 over Cain in view of Moore and Zhou be withdrawn.

Claims 32 and 33 stand rejected under 35 U.S.C. § 103(a) as allegedly unpatentable over Cain in view of Moore and Zhou. Merely in order to expedite prosecution, claim 32 has been amended to further clarify that the Fischer-Tropsch reactor is run under continuous operation. Applicants respectfully traverse this rejection.

As described above, Cain relates to a process for the purification of hydrocarbon solutions of oxygenated organic compounds comprising acids and which also may contain dissolved or occluded metal contaminants such as iron or iron compounds.

Also as described above, Moore is cited as disclosing that Fischer Tropsch streams are produced in processes that utilize iron or cobalt catalysts. Moore is also cited as disclosing "that F-T derived streams may be fractionated (i.e., distilled) and hydrotreated."

Zhou relates to a method for separating iron-based catalyst fines from hydrocarbon liquid/wax/catalyst slurry for Fischer-Tropsch synthesis processes by contacting and/or mixing the slurry with a coalescence enhancing treating solution to facilitate gravity separation and settling of such catalyst, and thereby yield a substantially clean hydrocarbon liquid/wax product. (Abstract). Zhou discloses that the treating solution includes a surface tension reducing agent, an agglutinating agent, and a coalescing agent, each in selected proportions in aqueous solution. (Abstract). Zhou is cited as disclosing filtration techniques used to separate solid contaminants from Fischer Tropsch derived streams.

As described above and as set forth in the Declaration, the presently claimed process is significantly different than the process of Cain and one of skill in the art would not merely combine process features of Moore with Cain.

Moreover, it is respectfully maintained that in no way does Cain, Moore, or Zhou disclose or suggest providing an additive to the contents of the Fischer-Tropsch reactor to precipitate soluble contamination within the reactor. Applicants note that the Examiner asserts that it would have been obvious to one having ordinary skill in the art to have modified the process of Cain by adding the acid to the reactor because the same purification would take place with the added benefit of cost savings due to the reduced equipment requirement. Applicants note, however, that it would not be practical or of added benefit to

add a water solution of acetic acid to the Fischer Tropsch reactor. Fischer Tropsch reactions are conducted at temperatures of 300 – 700 °F (149 – 371°C). A water solution would significantly cool the reactor causing the reactor to need to be reheated to reaction temperature to conduct Fischer Tropsch reactions. Furthermore, a water solution would evaporate at the reaction temperatures, and thus, could not be used to extract the product inside the reactor, unless first the reactor was cooled significantly and then heated again to reaction temperature. All of these possibilities for using the water solution in the reactor would not be practical or of added benefit, if possible at all. Applicants respectfully note that the Examiner did not address why it is alleged to remain obvious to add the acid to the reactor in light of the above-noted problems in doing so. Moreover, Applicants respectfully note that claim 32 has been amended to further clarify that the Fischer-Tropsch reactor is run under continuous operation.

Accordingly, for at least the above described reasons, Applicants respectfully request that the obviousness rejection of claims 32 and 33 over Cain in view of Moore and Zhou be withdrawn.

Conclusion

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims. In view of the foregoing remarks and amendments, and the previously submitted declaration of Richard O. Moore, Jr. pursuant to 35 U.S.C. § 1.132, reconsideration of the claims and allowance of the subject application is earnestly solicited.

In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

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